

# PATENT SPECIFICATION



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" " March 1, 1928. No. 6525/28.

One Complete Left: March 8, 1928.

Complete Accepted: April 19, 1929.

## PROVISIONAL SPECIFICATION.

No. 1858, A.D. 1928.

### Improvements in or relating to Apparatus for Indicating Relative Speeds.

I, LEONARD EUGENE COWEY, of Archer Works, Kew Gardens, Surrey, a Subject of the King of Great Britain, do hereby declare the nature of this invention to be as follows:—

This invention relates to apparatus for indicating relative speeds, and is primarily intended for use on motor vehicles of the type employing a change-speed gear box; the object of the invention being to facilitate the changing of the gears by the driver of the vehicle.

Suggestions have been made under which it is proposed to indicate the actual speed of the engine and also that of one of the moving parts connected with the vehicle itself; and by synchronising the two speeds, to facilitate the operation of gear changing.

Apparatus of this sort is, however, somewhat cumbersome and expensive, largely on account of the fact that the actual speed of each of the two units is indicated, whereas it is only really necessary to indicate the relative speed.

In carrying my invention into effect, I provide an instrument which is connected, on the one hand, either to the engine, or to some part driven thereby; and on the other hand, to a portion of the vehicle which runs at a speed corresponding to that of the vehicle itself.

Means are provided within the instrument for driving—at speeds corresponding to those arranged for in the gear box—indicating pointers, discs, or other parts, each of which corresponds to one of the gear box speed ratios.

These indicating pointers or discs are driven from a portion of the vehicle whose speed corresponds to that of the vehicle.

Attached to the portion of the instrument connected to the engine, is an index—preferably rotative and superimposed above the foregoing discs, so that

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a clear indication is given when the index and any one of the discs are proceeding at the same speed.

According to one modification of the invention, I provide in an indicating head (attached to the instrument board of the vehicle) three or more concentrically-arranged discs corresponding to each of the speed changes in the gear box. These concentric discs are marked differently from each other, and each contains a series of radial lines.

Superimposed above the concentric discs is one made of celluloid, or other transparent material, upon which is marked a series of radial lines proceeding from the centre to the periphery. The latter-mentioned disc is driven from the engine, or part controlled thereby; whereas the three or more concentric discs, by means of suitable gearing within the instrument itself, are each driven from a part of the gear box which corresponds to the speed of the vehicle; the speed of each concentric disc being proportional to that of the speed gear which it represents.

The speeds of the various parts being correctly arranged, it will be evident that when the disc driven by the engine is proceeding at the same speed as any one of the three concentric discs, the gear represented by the disc in question will be available for engagement.

In using the indicator for the purpose of changing gear, the operation of changing from a high gear to a low gear would be accomplished by the usual method of double declutching, and works out as follows: The clutch is disconnected, and the gear lever put into neutral, whereupon the clutch is again engaged. At this point in the operation, the speed of the engine is accelerated until such time as the engine index is seen to be rotating at the same speed as the concentric disc

corresponding to the low gear in question. As soon as this condition is established, the clutch is again disengaged and the gear lever pushed into the selected gear 5 position. In changing from a low gear

to a high gear, the operation would, of course, be reversed.

Dated the Eighteenth day of January, 1928.

LEONARD E. COWEY.

# PROVISIONAL SPECIFICATION.

No. 2362, A.D. 1928.

## Improvements in or relating to Apparatus for Indicating Relative Speeds.

I, LEONARD EUGENE COWEY, of Archer Works, Kew Gardens, Surrey, a Subject of the King of Great Britain, do hereby declare the nature of this invention to be as follows:—

This invention relates to apparatus of the class set out in my previous Specification No. 1858/1928.

The principal object of the present invention is to ensure easier readings of the apparatus, by arranging that any indicating pointers or disc, together with the index, shall be without apparent motion at the time when a change may be accepted by the corresponding gear.

According to one modification of the invention, I provide a fixed outer casing, attached to which is a fixed dial containing index slots corresponding to the various gear changes; and in order to simplify the use of the instrument, a diagram is preferably marked on the dial, indicating the position of the various movements in the gear box necessary for the respective changes of speed. Adjacent to each of these positions is one of the index slots above referred to.

Within the fixed outer casing is a rotating member, driven from the engine or engine shaft, or alternatively, from the propeller shaft of the vehicle.

Within the rotating member is a series of planetary gears corresponding to the various changes of speed in the gear box. These planetary gears are driven by a shaft connected with the propeller shaft of the vehicle, or alternatively, with the engine or engine shaft. The arrangement between the various parts is such that, whereas the rotating member is driven in one direction, the indicating discs connected to the planetary gears, are driven in the opposite direction; the various gears being so arranged that, when the speed of the engine shaft is correct in relation to that of the propeller shaft for the purpose of effecting a change of gear, the indicating disc connected with that particular change will have no apparent rotation in relation to the fixed index slot, as it will be merely travelling on the rotating member at the same speed that the latter is being driven in the opposite direction—Hence, an observation on the part of the driver to the effect that any particular indicating disc is in an apparently stationary condition, will mean that that particular gear relating thereto is in a condition to be engaged.

Dated the Twenty-third day of January, 1928.

LEONARD E. COWEY.

# PROVISIONAL SPECIFICATION.

No. 6525, A.D. 1928.

## Improvements in or relating to Apparatus for Indicating Relative Speeds.

I, LEONARD EUGENE COWEY, of Archer Works, Kew Gardens, in the County of Surrey, a British Subject, do hereby declare the nature of this invention to be as follows:—

This invention relates to apparatus for indicating relative speeds, and has more particular reference to the subject matter

of my two prior applications for Letters Patent Nos. 1858 dated the 19th January 1928, and 2362 dated the 24th January 1928.

The invention covered by the above applications relates to means for indicating in a motor driven vehicle the relative speed of the engine and that of the

vehicle wheels, these indications being transmitted by intermediate gearing to a dial wherein the relation of these speeds the one to the other can be visually estimated.

The present invention consists in a housing and dial arrangement in which windows or sight openings are formed in the dial plate to give the visual indication to the driver and in which an indication is also given of the location of the gears, so that reference to the dial also indicates not only the time at which to change gears but also the necessary movement of the gear change lever.

In carrying this invention into effect and in the preferred manner, the relative speed indicating device is mounted within an instrument case of normal dimensions, the face being covered by a dial having windows or sight openings which are pre-

ferably mutilated concentric apertures there being a separate window to each speed provided by the gear box. These windows are disposed over the dials appropriate to the gears they indicate, and disposed between these indications is a marking formed by printing, engraving or other means upon the dial, showing the gate openings for the gear change lever in passing from one gear to another. In order to make this latter indication complete a "reverse" indication is given on the dial although there be no indicating window covering movement of the vehicle in a backward direction.

Dated this 1st day of March, 1928.

FRANCIS HERON ROGERS,

Agent for Applicant,

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#### COMPLETE SPECIFICATION.

#### Improvements in or relating to Apparatus for Indicating Relative Speeds.

I, LEONARD EUGENE COWEY, of Archer Works, Kew Gardens, Surrey, a British Subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to indicating devices for facilitating the use of change speed gearing and more particularly to devices of a type wherein one or more discs or other moving elements is geared to the driving and driven shafts in such manner that each disc or element indicates by its state of rest or motion whether the relative speeds of the driving and driven shafts correspond to a particular gear ratio.

The object of the invention is to provide an improved construction of indicating device of this kind which will give a visual indication to the driver of a vehicle when the appropriate time for engaging a particular gear ratio has arrived.

According to the invention the discs or other moving elements geared to the driving and driven shafts are covered by a plate or casing having openings through which portions of the discs or elements are visible and have colour bands or other markings arranged thereon whereby it can be readily seen when the disc or element beneath a particular opening is stationary.

According to one form of the inven-

tion the absolute speed of each disc is determined by the relative speed of the driving and driven shafts of the change speed gear but in an alternative arrangement the discs or other elements are arranged in pairs and so geared that the elements of a particular pair move at the same speed when the relative speed of the driving and driven shafts correspond to a particular gear ratio. In this case it is the state of rest or motion of the one disc relative to the other which determines when the time has arrived for engaging any particular gear and the colour bands or other markings on the disc are therefore arranged so as to present the appearance of no motion when moving at the same speed.

In order that the invention may be more readily understood, reference will now be made to the accompanying drawings in which:—

Figure 1 is a sectional elevation of this form of the invention suitable for a three speed gear box vehicle,

Figure 2 is a part plan of Figure 1 showing driving connections,

Figure 3 is a dial face indicator for motor vehicles having a three speed gear box,

Figure 4 shows alternative dial faces for four speed gear boxes.

Referring to the drawings and Figs. 1 and 2 therein, 1 is the casing of the indicating instrument having a base extension 2, or bracket in lieu thereof for mounting. Concentrically disposed in

the casing 1 is a rigid vertical shaft 3. Disposed concentrically upon this shaft 3 are the various driving and driven gears, housings therefor and indicator discs. The vertical shaft 3 may be grooved for lubrication and may be so mounted within the casing that it and its accessory gears can be bodily removed from, and inserted in the said housing, means (not shown) being provided for preventing rotation and the assembly of parts upon its length adjusted and fixed into position by lock nuts 4 at top and bottom.

Disposed of over said shaft is the vehicle driven worm wheel 5, mounted fast upon sleeve 6 said wheel 5 being rotated by worm 7 mounted in bearing 8, and flexibly and rotatably coupled by a shaft (not shown) to a suitable driven member of the car such for instance as the propeller shaft. Fast with the sleeve 6 is the planetary gear housing 9. Rotatably mounted with said housing 9 is a vertical shaft 10 and sleeve 11 and disposed over said sleeve in fast rotation therewith are pinions 12a, b, and c meshing with wheels 13 a, b, c each of the latter wheels being mounted fast with bearing sleeves 14 a b c rotatable about a common axis and each of said sleeves carrying dials 15 a b c.

Rotatably disposed over the bearing sleeve 6 and fast with each other are the worm wheel 16 and spur pinion 17. The worm 18 is mounted in a bracket 8<sup>a</sup> and is operated and driven in exactly the like manner to that operating the worm wheel 5 except that its flexible shaft is driven from the engine. The spur pinion 17 meshes with the spur wheel 19 secured to the rotary shaft 10.

One or more sets of planetary gear may be provided in the housing 9 meshing with the wheels 13 a b c and having spur wheels 19 meshing with spur pinion 17, but if only one set is provided it is necessary to counterbalance the weight of the planetary wheel assembly and this is done by means of a counterbalance 20 secured in position shown in the housing 9, and this weight may in addition have an adjustment device for accurate positioning after trial. The dials 15a, 15b, and 15c, are formed in convenient material, and superficially appear as annular rings the one nesting within the other. In the form shown the outermost 15a represents top gear, the intermediate dial 15b, the second gear and the innermost 15c bottom gear or first gear. Disposed over the said dials is a slotted dial 21, see Figs. 3 and 4, and this is held in stationary position by a washer 22 in conjunction with the closing bezel ring 23 carrying the glass cover 24

The dial plate 21 has slots 25 cut therein which slots are so positioned over the dials as to indicate the gear speed to which the slot relates and against such slots are indications 26 numbered to denote the gear box speed to which the slot relates. Clearly marked on said dial is a skeleton gate chart 27 giving a key to the gate change motions of gear changing lever. For quick visual identification the dials 15 have individualising colours or are separately marked as at 28 so that the driver has immediate knowledge as to whether vehicle speed is equal to engine speed, and this may be carried to the extent of so colouring the discs with elementary pigments that their rapid movement give a white or whitish indication and their stationary movement an arresting indication of colour or colours.

In the modified form of the invention shown under the dial indication of Fig. 3 a disc representing engine speed is driven through convenient intermediate gearing from the engine driven shaft and worm 18. This disc 29 is always revolving and is transparent but marked with concentric rings by any suitable means. Disposed below said engine disc 29 are vehicle speed discs driven in like manner to the method shown in Fig. 1 excepting that the counter directional gearing constituted by wheels 17 and 19 are omitted and thus in this form of the invention a visual indication of correct relative speed between that of the vehicle and engine revolutions is given by the markings of the discs through the appropriate slots or openings becoming similar, coincident or of equal colour value.

In operation of the invention and as shown in the preferred form under Fig. 1 the worm wheels 5 and 16 are respectively driven from the vehicle and engine, and their motion is so imparted to the planetary and sun gears 12 and 13 that when there be no relative motion between the particular gear ratio and engine speed the indicating dial of such gear is stationary. The driver of the vehicle waits for this lack of motion on the dial, de-clutches and following the gate change motion shown on the dial at 27, moves his lever to accord with gear indicated as appropriate for change when a noiseless transfer takes place.

Although the invention is described as applied to a motor vehicle it is obvious that its scope is not restricted in any way to such application and that the relative speed of any two given members may be compared by the means constituting the invention.

Further the dial indicating arrange-

ments may be illuminated or artificial light employed within or without the container 1 and the dials slotted or masked or otherwise contrived to give a light signal when speed equality at any stage has been attained.

Although for the sake of compactness advantage has been taken of sun and planet gears to achieve the object of the invention in the described form under Fig. 1 it is obvious that other known forms of counter directional driving of a rotary member may be employed for the purpose.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. An indicating device for facilitating the use of change speed gearing wherein one or more discs or other moving elements, geared to the driving and driven shafts in such manner that each disc or element indicates by its state of rest or motion whether the relative speeds of the driving and driven shafts correspond to a particular gear ratio, are covered by a plate or casing having openings through which portions of the discs or elements are visible and wherein the portions of said discs or elements which move beneath the openings bear colour bands or other markings whereby it can be readily seen when the disc or element beneath a particular opening is stationary.

2. An indicating device for facilitating the use of change speed gearing wherein one or more pairs of rotary elements are geared to the driving and driven shafts in such manner that the elements of a particular pair move at the same speed when the relative speeds of the driving and driven shafts correspond to a particular gear ratio, and wherein portions of each pair of elements have colour bands or other markings arranged thereon in

such manner as to present the appearance of no motion when moving at the same speed.

3. An indicating device as claimed in claim 1 or 2 wherein the rotation of the driving and driven shafts is transmitted to worm reduction gearing mounted in the same casing with the indicating part of the device.

4. An indicating device as claimed in claim 1 or 2 wherein a series of nested indicating dials is mounted in a casing containing a central shaft supporting rotary gears by which the dials are driven.

5. An indicating device of the type referred to in claim 1, wherein said moving elements comprise a series of rotary dials mounted upon a supporting shaft and geared to planet wheels carried by a rotary housing also mounted on said shaft, substantially as and for the purpose set forth.

6. An indicating device according to any of the preceding claims wherein the gate openings of a gear change lever are indicated on the face of the instrument in relation to openings or windows through which the dials or other moving elements are placed in such manner as to indicate the movements of the lever substantially as set forth.

7. In an indicating device as claimed in Claim 3, the mounting of the co-operating members upon a central shaft within a container in such manner that the whole of said device can be mounted or detached as a unit in or from said container.

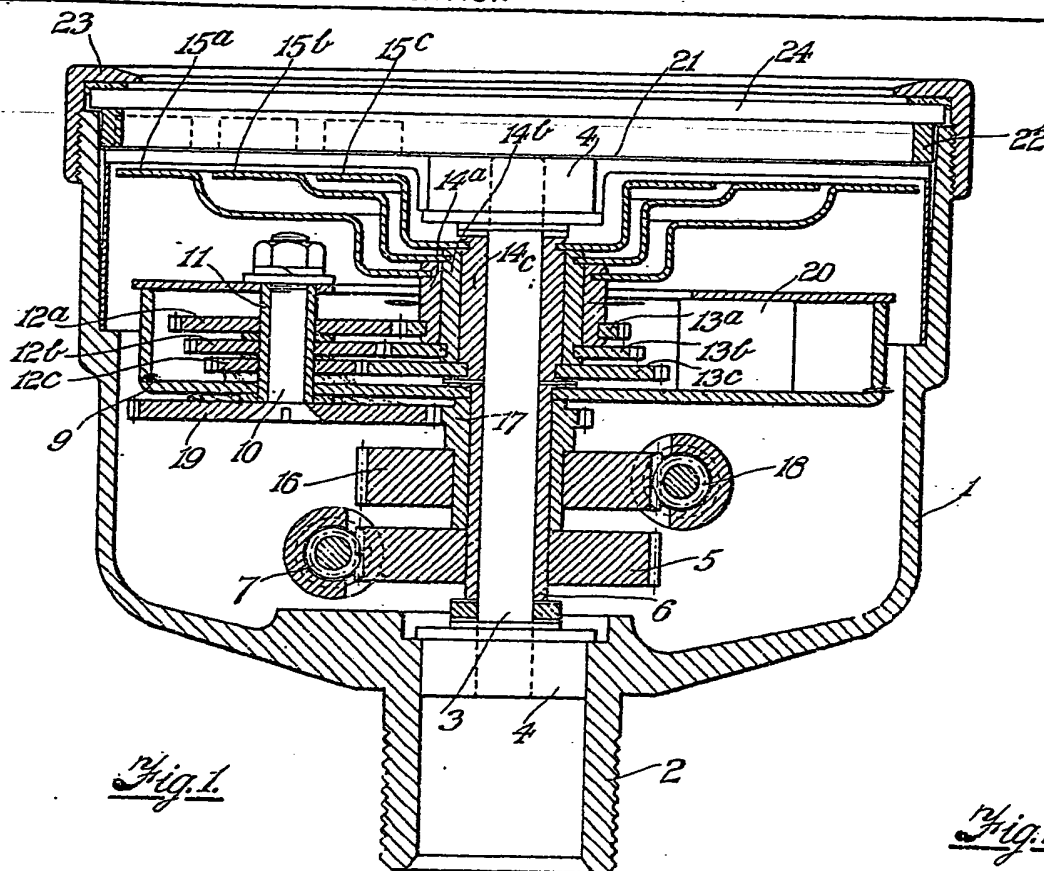
8. The device for indicating relative speeds substantially as described and as illustrated in the accompanying drawings.

Dated this 8th day of March, 1928.

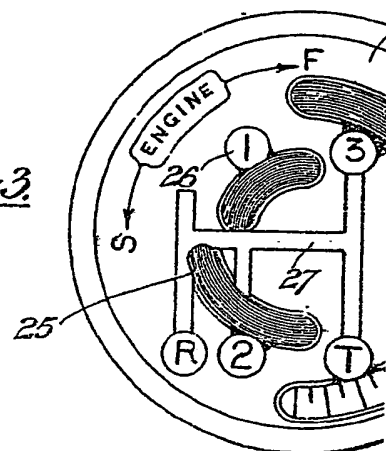
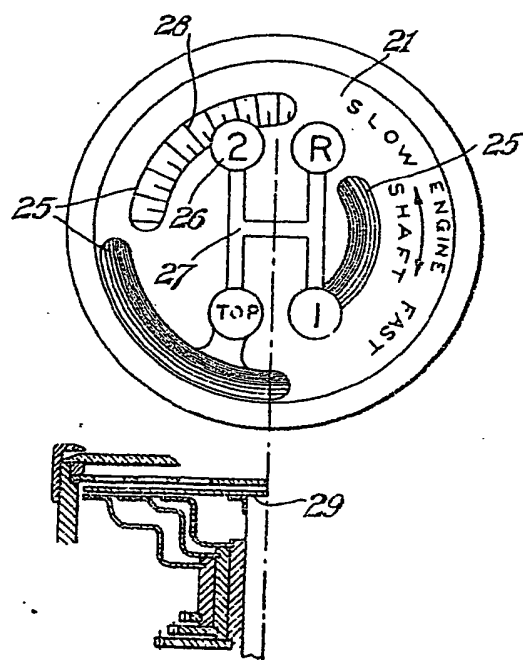
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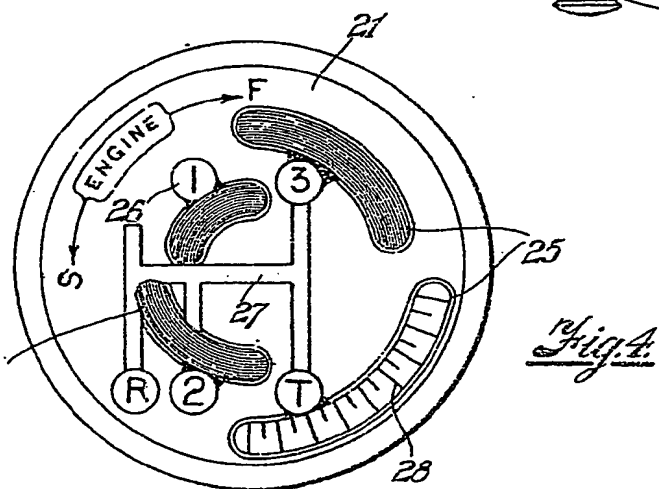
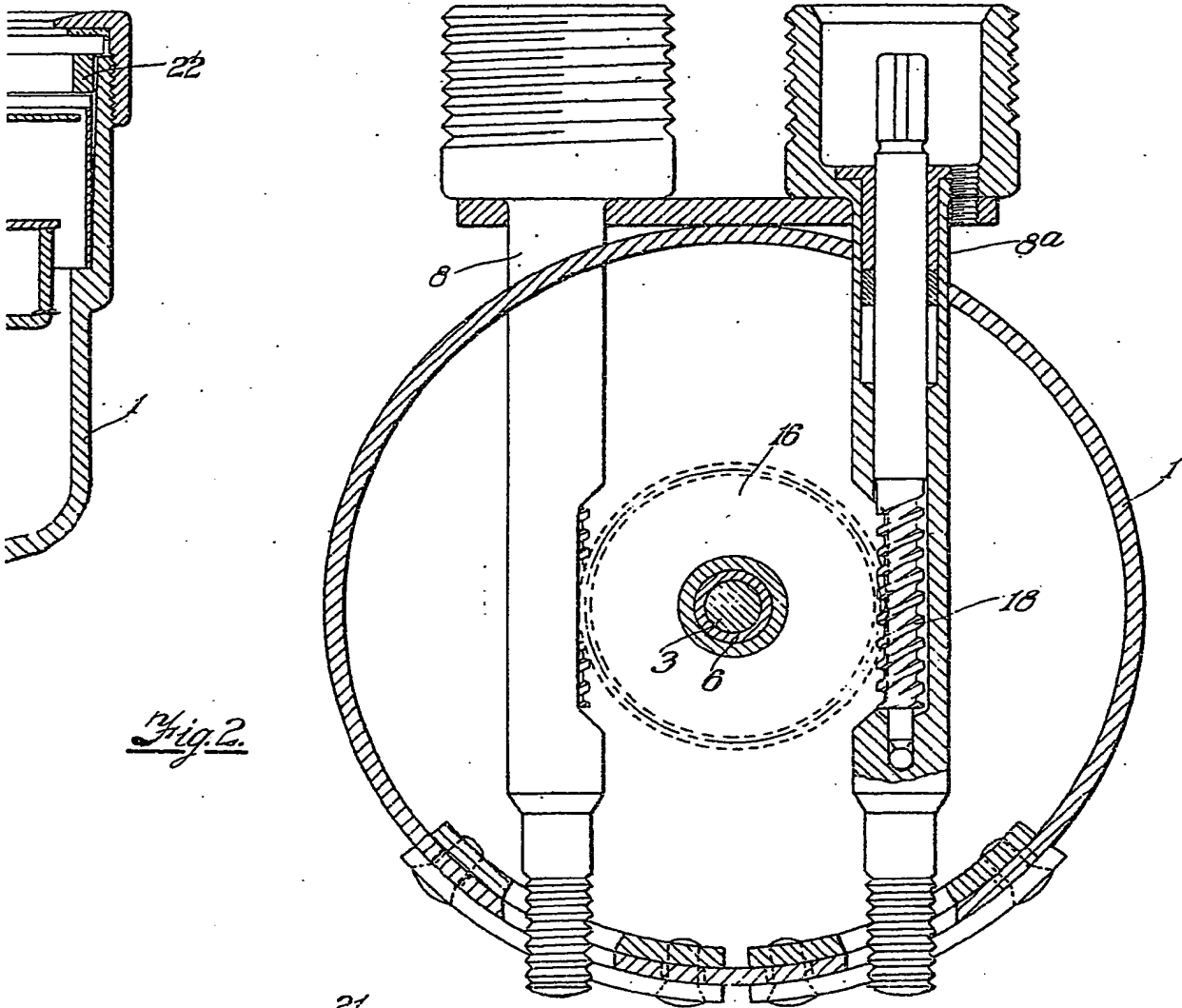
310,301 COMPLETE SPECIFICATION

[This Drawing is a reproduction of the Original on a reduced scale.]



*Fig. 2.*





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